HP StorageWorks

Booting Windows Server 2003 and Windows Server x64 Edition systems from a storage area network application notes

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About this document

This section describes the content reflected in this document, including:

- Application notes information, page 3
- Intended audience, page 3
- Accessing future product updates, page 3

Application notes information

These application notes describe storage area network (SAN) boot setup procedures for specific software solutions, Fibre Channel host bus adapter (HBA) firmware versions, and boot BIOS versions.

For the latest version of these application notes and other storage documentation, see the HP storage web site http://h18006.www1.hp.com/storage/saninfrastructure.html.

Intended audience

This document is intended for customers who are familiar with:

- The following storage arrays and the interconnections required to attach to an HBA on a Windows® server:
 - Enterprise Virtual Arrays (EVAs)
 - Modular Smart Arrays (MSAs)
 - XP Disk Arrays (XP)
 - Enterprise Modular Arrays (EMAs)
- Windows Server 2003 and Windows Server x64 Edition operating systems
- HBAs
- Switch zoning

Accessing future product updates

HP strongly recommends that customers sign up online using the Subscriber's Choice web site http://www.hp.com/go/e-updates.

- Subscribing to this service provides you with e-mail updates on the latest product enhancements, newest versions of drivers, and firmware documentation updates, as well as instant access to numerous other product resources.
- After signing up, you can quickly locate your products by selecting **Business support** and then **Storage** under Product Category.

Why boot from a SAN?

Traditionally, HP ProLiant servers boot operating systems from internal SCSI and IDE storage devices. With the support of external booting with StorageWorks Fibre Channel HBAs and RAID arrays, customers can optionally eliminate server-based internal boot devices. Booting from an external device decreases downtime through faster server replacement in the event of a server failure.

Booting from the SAN provides:

- Redundant storage paths
- Disaster recovery
- Improved security
- Minimal server maintenance
- Reduced impact on production servers
- Reduced backup time

Additional information

For detailed information about HBAs, switches, storage arrays, and storage software, go to the following HP web sites:

Table 1 HP web site resources

Topic	HP web site
HBAs and switches	http://h18006.www1.hp.com/storage/saninfrastructure.html
Storage array systems	http://h18006.www1.hp.com/storage/arraysystems.html
Multipathing	http://h18006.www1.hp.com/products/sanworks/secure-path/index.html and http://h18006.www1.hp.com/products/sanworks/multipathoptions/index.html
ProLiant servers	http://h18004.www1.hp.com/products/servers/platforms/storage.html

Supported configurations

This document describes single-server, cluster, multipath, and Secure Path-based configurations using:

- EVA
- MSA
- XP
- EMA
 - Transparent failover mode
 - Multiple bus failover mode or single-path mode

Required hardware and software

Table 2 lists the hardware required to boot from a SAN.

Table 2 Required hardware and software

Supported feature	Requirement
Operating systems	Windows NT® 4.0 Enterprise Edition with SP6a Windows NT 4.0 Server with SP6a Windows 2000 Server with SP3, SP4 Windows 2000 Advanced Server with SP3, SP4 Standard and Enterprise editions of: Windows Server 2003 Standard Edition with SP1and later Windows Server 2003 x64 Edition
RAID arrays	EVA MSA XP EMA

Supported feature	Requirement
Fibre Channel switches	B-Series, C-Series, and M-Series switches. See the *HP StorageWorks SAN design reference guide* for the latest supported switches on the web site http://h18006.www1.hp.com/products/storageworks/san/documentation.html. On M-Series switches, only the entry-level models Edge Switch 2/12 and 2/24 are supported for BL3xp connectivity using Fx ports. **Note**: For BL3xp servers with Emulex-based Fibre Channel Mezzanine HBAs, you must disable the M-Series switch port fan.
Servers	All HP ProLiant servers, including HP ProLiant blade servers, are supported. For detailed information, see http://h18004.www1.hp.com/products/servers/platforms/storage.html. If you are using the Rapid Deployment Pack, see the support matrix for supported servers on the web site http://www.hp.com/servers/rdp. **Note**: There is no support for DL140 and DL145 servers.
HBAs	1050EX PCI-Express host bus adapter, part number A7650A 64-bit PCI to Fibre Channel 1-GB host bus adapter DS-KGPSA-CB, part number 176479-B21 A7387A dual-channel PCI-X 2-GB host bus adapter, part number A7650A A7388A PCI-X 2-GB host bus adapter, part number A7388A FCA2101 2-GB, host bus adapter, part number 245299-B21 FCA2355DC 2-GB PCI-X host bus adapter, part number 308540-B21 FCA2214 2-GB PCI-X host bus adapter, part number 281541-B21 FCA2214DC 2-GB PCI-X host bus adapter, part number 321835-B21 FCA2404 2-GB PCI-X host bus adapter, part number 305573-B21 FCA2404DC 2-GB PCI-X host bus adapter, part number 323264-B21 FCA2408 2-GB PCI-X host bus adapter, part number 343073-B21 FC2142SR 4Gb PCI-Express host bus adapter, part number A8002A FC2242SR 4Gb PCI-Express host bus adapter, part number A8003A FC2143 4Gb PCI-X 2.0 host bus adapter, part number AD167A FC2243 4Gb PCI-X 2.0 host bus adapter, part number AD168A FC1143 4Gb PCI-Express host bus adapter, part number AE311A FC1243 4Gb PCI-Express host bus adapter, part number AE312A HP QLogic Dual Port Fibre Channel Mezzanine HBA 2-Gb for BL20Gp2 G2, part number 300874-B21 HP BL20p G2 Fibre Channel Mezz Adapter, product number 300874-B21 HP BL20p G3 Fibre Channel Adapter, product number 361426-B21 HP BL30p/BL35p Dual-Port Fibre Channel Adapter, product number 354054-B21 HP BL25p/BL45p Fibre Channel Adapter, product number 381881-B21 HP Emulex-based Fibre Channel Mezzanine HBA for HP p-class systems for BL30pG1, BL25p, BL35p, and BL45p, part number 394588-B21 HP Emulex-based Fibre Channel Mezzanine HBA for HP p-class systems for BL20pG3, part number 394757-B21 HP QLogic QMH2462 4Gb FC HBA for HP c-Class BladeSystem, part number 403619-B21 HP Emulex LPe1105-HP 4Gb FC HBA for HP c-Class BladeSystem, part number 403621-B21 See the HBA release notes for the latest firmware, driver, BIOS versions, and LUN limitations on http://h18006.www1.hp.com/storage/saninfrastructure.htm.

Restrictions

The following sections describe restrictions for booting from a SAN.

Operating system restrictions

The following operating system restrictions apply:

- Microsoft® Windows operating systems require a unique, dedicated disk for booting. Therefore, each server connected to a RAID array must have its own disk, or logical unit number (LUN), dedicated for booting and operating system files. Data can be allocated across both the boot disk and the remaining disks. Booting from array-based disk partitions is possible.

NOTE:

The memory paging system requires fast access to the `pagefile.sys` file. In SAN environments with heavy I/O loads, the access request for moving information to or from the paging file may be delayed. This can cause the operating system to halt, requiring a reboot to recover. Microsoft recommends that if paging errors occur, page files should be relocated to disks that are built into the server using its internal data paths. See the Microsoft article for additional recommendations on booting from a SAN on the Microsoft web site http://support.microsoft.com/default.aspx?scid=kb;EN-US;q305547.

For Windows Server 2000 and Windows Server 2003, a crash dump file will not be generated if, at the time of a system crash, the active path to the system drive is different from the active path established when the system was booted. To ensure that a crash dump is created, restore the path that was the active path at boot time as soon as possible after the failure, and make it the active path. For detailed information, see the Crash Dump File Creation section in http://download.microsoft.com/download/f/9/7/f9775acc-baa6-45cc-9dec-b82983705620/Boot%20from%20SAN%20in%20Windows.doc.

- You must use Windows Server 2003 SP1 in a Continuous Access EVA configuration. Boot Vdisks and application Vdisks must be in separate DR groups. Boot Vdisks for a server or clustered servers must be in a separate DR group.
- Windows Server 2000, SP4 Update Rollup 1 is required for CD-ROM or diskette installations. Create a slipstream CD-ROM when using this installation method.
- You may need to disable USB 2.0 (EHC1) support in newer ProLiant servers to install Windows 2000. See Customer Advisory Document ID: EM050505_CW01, available on the HP Support web site http://welcome.hp.com/country/us/en/support.html.

Clustered server restrictions

This section describes clustered server restrictions for SCSIPORT and Storport miniport drivers.

SCSIPORT miniport driver

The following SCSIPORT miniport driver restrictions apply:

- Microsoft requires that Microsoft Cluster Servers (MSCS) keep boot disks and shared storage paths on separate data paths. See the article on the Microsoft web site http://support.microsoft.com/default.aspx?scid=kb;en-us;305547.

 These configurations require a minimum of four HBAs. HP ProLiant BL20p, BL25p, BL30p, and BL35p servers are not supported because they support only two HBA ports.
- EMAs (HSG80) support only the multibus configuration.
- HP ProLiant BL20p is the only blade server supported on EMAs (HSG80).

NOTE:

References to the HSG80 cover all MA8000 RAID array products.

Storport miniport driver

This section describes Storport miniport driver restrictions.

- For Storport miniport driver restrictions, see the following Microsoft articles:
 - To set up MSCS properly, see "Cluster is formed by using a local quorum resource after a cluster setup failure in Windows Server 2003," available on http://support.microsoft.com/?kbid=888160.
 - For boot from SAN and MSCS configurations on Windows Server 2003 systems, see "The updated Storport storage driver, version 5.2.3790.2494, is available for Windows Server 2003," available on http://support.microsoft.com/kb/912944/en-us and "How to add a registry value to a Windows Server 2003-based computer that you start from a SAN so that the startup disk, the pagefile disks, and the cluster disks are all on the same SAN fabric," available on http://support.microsoft.com/kb/886569/en-us.
- To avoid improper modification of the registry, use the Boot from SAN Cluster Registry Update utility to add the ManageDisksOnSystemBuses key. Download the utility (`BFSCLRegUp.exe`) from http://h18006.www1.hp.com/storage/saninfrastructure.html.
- A minimum of two HBA ports per host is required for any High Availability (HA) configuration. For detailed information, see the ProLiant High Availability web site http://h18004.www1.hp.com/solutions/enterprise/highavailability/index.html.

Stand-alone server restrictions

In a stand-alone server environment, an HBA port can share boot and data paths.

Server replacement in the event of a server failure

You must retain the HBAs to ensure that the replacement server hardware components are identical to the ones you are replacing. Place each HBA in the PCI slots of the new server in the same order they were placed in the old server.

If you are using an internal disk for your paging file system, move the disk to the replacement server. You can also use a new disk, but you must format it and manually reset the paging to that disk.

For Mezzanine-based blade servers, you must remap all LUNs to the onboard HBAs.

Boot setup overview

The following sections describe Windows boot setup procedures:

- Boot setup restrictions, page 18
- Setting up the server, page 18
- Setting up the HBAs, page 19
- Setting up switch zoning, page 21
- Creating a LUN, page 21
- Installing the operating system, page 23
- Setting up multipathing, page 25

You can use the ProLiant Essentials Rapid Deployment Pack to provide automated server deployment and redeployment.

- For Rapid Deployment Pack 1.60 and 2.00, see Article 127, available on http://www.hp.com/servers/RDP/KB.

- For Rapid Deployment Pack 1.40 or 1.50, see "Deploying servers that boot from a SAN with the Rapid Deployment Pack 1.40 or 1.50" on page 26 before performing the Enterprise Modular Array or Enterprise Virtual Array procedures.

Prerequisites

To perform these procedures, you should be familiar with:

- HSG80-based, Enterprise Virtual Array-based, Modular Smart Array-based, or XP-based Fibre Channel RAID array technology and the interconnections required to attach to an HBA in a Windows-based server. This information is in the RAID array and/or Software Solution Kit documentation.
- Windows NT 4.0, Windows 2000, or Windows Server 2003.

This document does not describe the following procedures, but you must perform them before you begin the installation:

- For the MA8000/EMA12000/EMA16000 or MA6000:
 - Set and/or verify the HSG80 controller port topology for your configuration.
 - Set and/or verify the controller SCSI version. In SCSI-3 mode, LUN 0 is assigned to the command console. Therefore, the unit you designate as your boot disk must be LUN 1 or higher. HP recommends SCSI-3 mode.
 - Verify that all existing storage units have the proper access.
 - Delete any unused connections.
- Verify that all storage units (virtual disks) have the proper access settings.
- In switch-based configurations, if zoning is enabled, check the switch to ensure that there are no zoning conflicts.

Working with boot disk partitions

Consider the following when working with boot disk partitions:

- Before creating a boot disk, you must start with a clean, unpartitioned virtual disk.
- When booting from a RAID array that has other virtual disks attached to other servers, be aware that when setting up booting for the new server, the installation program may display a list of partitions visible for loading the operating system. The display contains a disk for every controller port accessible by the HBA.
- HP recommends that only one instance of the boot LUN be visible to the server during the initial installation. The installation may fail if multiple instances of the boot LUN are available to the server.

Windows boot process

For detailed information about the Windows boot process, see the following articles:

- "Windows NT Boot Process and Hard Disk Constraints" available on http://support.microsoft.com/kb/114841/en-us
- "Boot from SAN in Windows Server 2003 and Windows 2000 Server" (page 8, footnote 8) on http://download.microsoft.com/download/f/9/7/f9775acc-baa6-45cc-9dec-b82983705620/Boot%20from%20SAN%20in%20Windows.doc

Deployment considerations

The ProLiant Essentials Rapid Deployment Pack provides automated server deployment and redeployment through a central console using imaging and scripting technologies for ProLiant servers. The deployment console provides simple drag-and-drop functionality for deployment events.

Switch-based zoning

You must be familiar with switch-based zoning. For specific information about zoning for your environment, see your switch's installation guide.

Cabling options for single-channel HBAs

SAN boot is supported in the zoned single-channel HBA configurations, as shown in Figure 1 through Figure 6.

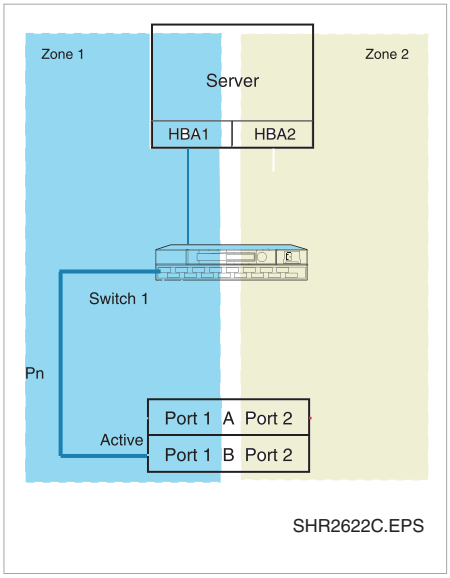


Figure 1 Single server, two single-channel HBAs, one switch, straight-cable storage configuration

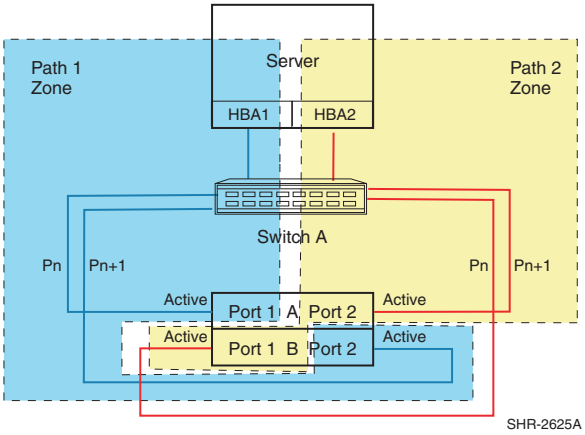


Figure 2 Single server, two single-channel HBAs, one switch, cross-cable storage configuration

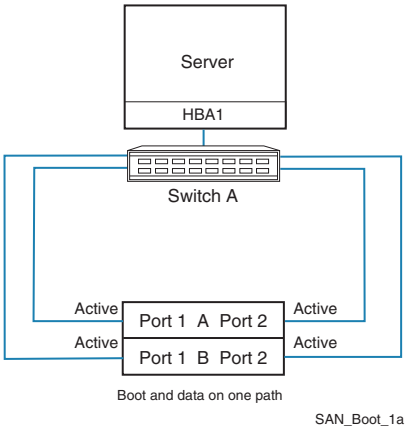


Figure 3 Single server, one HBA, one switch configuration

The following configurations shown inFigure 4 and Figure 5 support SCSIPORT or Storport miniport drivers.

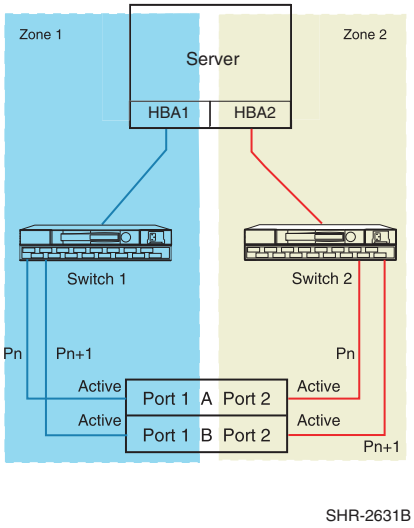


Figure 4 Single server, two single-channel HBAs, two switches, straight-cable HA storage configuration

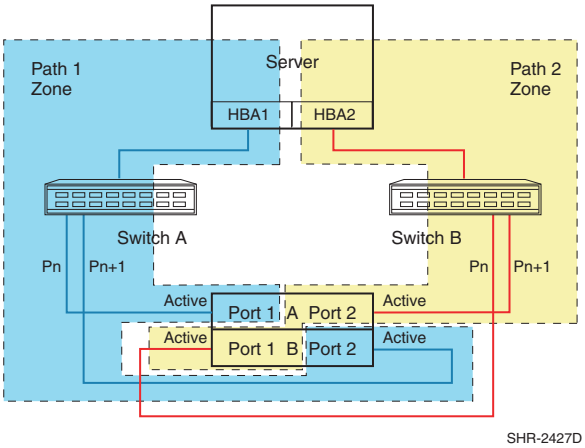


Figure 5 Single server, two single-channel HBAs, two switches, straight-cable HA storage configuration

The configuration shown in Figure 6 supports SCSIPORT or Storport miniport drivers.

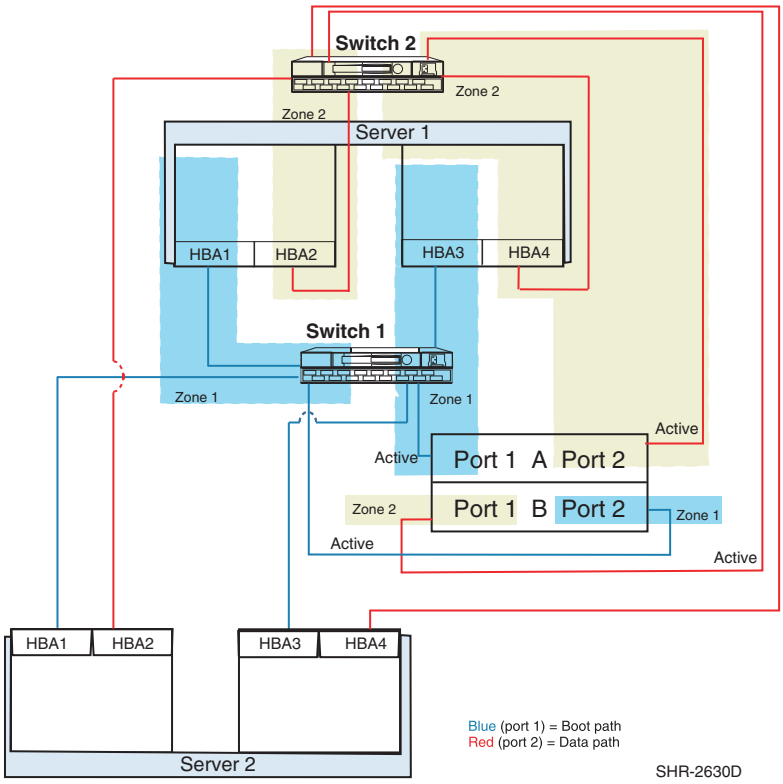


Figure 6 Clustered servers, four single-channel HBAs per server, two switches, cross-cable HA storage configuration

Cabling options for dual-channel HBAs

Dual-channel HBAs are typically used when the number of server PCI slots is limited. Figure 7 through Figure 12 show the cabling options for dual-channel HBAs.

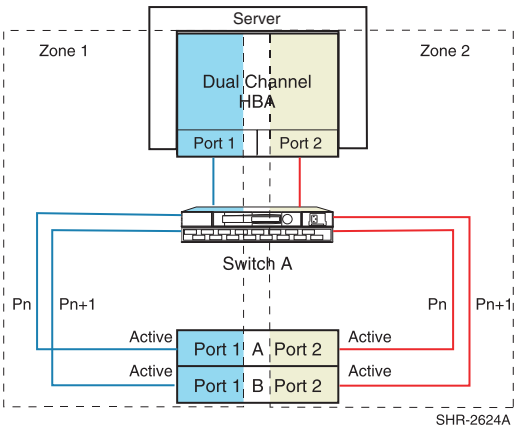


Figure 7 Single server, one dual-channel HBA, one switch, straight-cable storage configuration

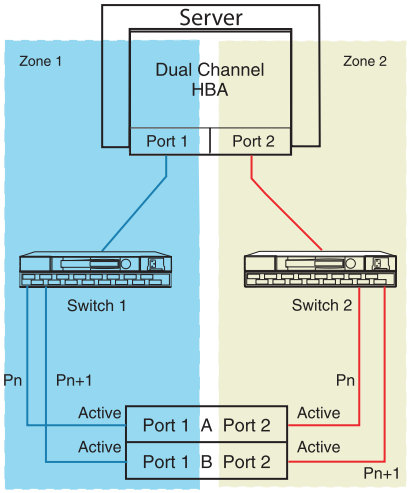


Figure 8 Single server, one dual-channel HBA, one switch, straight-cable storage configuration

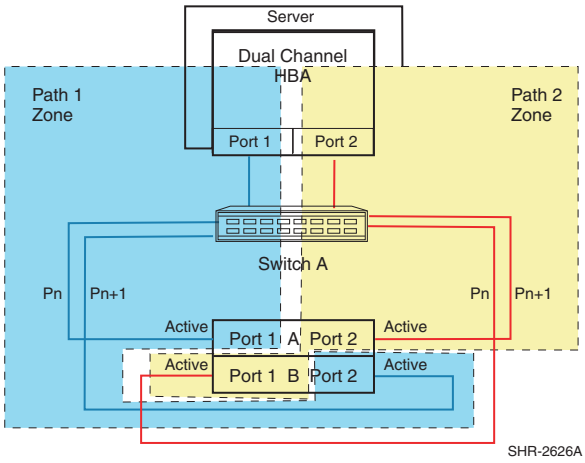


Figure 9 Single server, one dual-channel HBA, two switches, cross-cable storage configuration

The configuration shown in Figure 10 requires a Storport miniport driver.

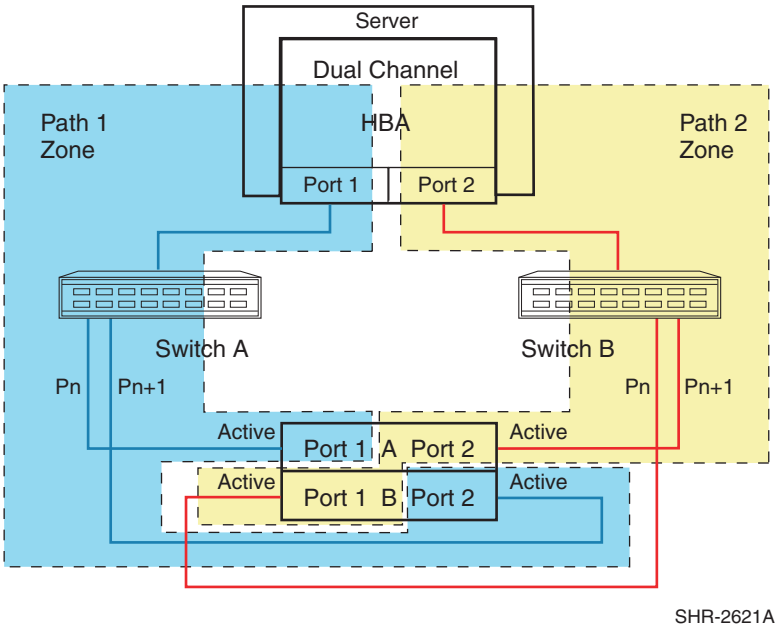


Figure 10 Single server, one dual-channel HBA, two switches, straight-cable HA storage configuration

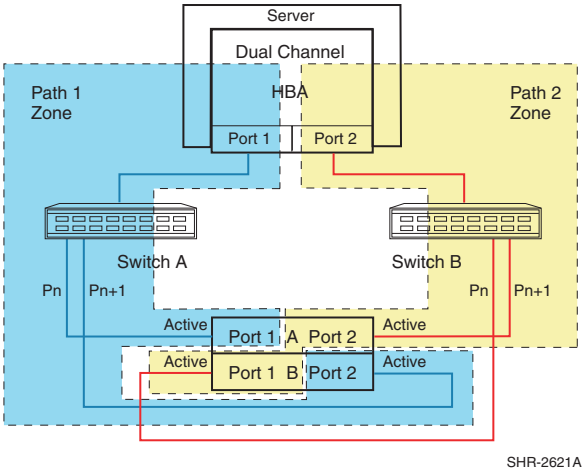


Figure 11 Single server, one dual-channel HBA, two switches, cross-cable HA storage configuration

The configuration shown in Figure 12 supports Storport miniport drivers.

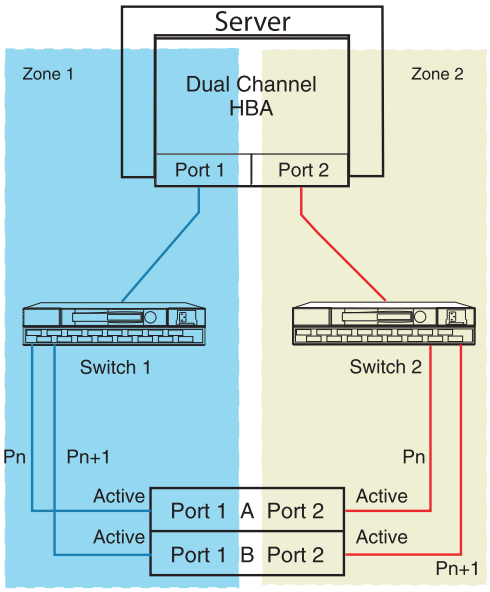


Figure 12 Single server, one dual-channel HBA, two switches, cross-cable HA storage configuration

Storport miniport driver support for boot from SAN configurations

HP supports the Storport miniport driver for Windows Server 2003 SP1 for boot from SAN configurations.

For more information about the Storport miniport driver, see the Microsoft web site http://www.microsoft.com/windowsserversystem/storage/technologies/storport/storportwp.mspx.

You can obtain supported Storport miniport drivers from the HP SAN Infrastructure web site http://h18006.www1.hp.com/storage/saninfrastructure.html.

Installation overview

HP supports installing the operating system using SCSIPORT miniport driver, and then upgrading to the Storport miniport driver using the `Storport.sys` update. This update is available from Microsoft if you have SP1 or later. For information about the update, see http://support.microsoft.com/search/?adv=1.

NOTE:

Installing Windows Server 2003 using a "slipstreamed" image that includes SP1 installs the Storport miniport driver. If you use this method, omit step 3 in the following procedure.

Installing the driver

To install the driver:

1. Install the operating system using the SCSIPORT miniport driver, as described in "Installing the operating system" on page 23.
2. Reboot the server.
3. Update `Storport.sys` using SP1 or later.
4. Update the Storport miniport driver using HP's Smart Component.
5. Configure the driver for multiple paths.

Considerations for booting clusters with SCSIPORT miniport drivers

Windows operating systems require that the HBA used for booting is not the same HBA used for cluster shared storage. You must use separate HBAs or HBA ports on each server when setting up for cluster booting. In general, the key steps for setting up booting include:

- Installing all HBAs but not connecting them
- Configuring each HBA that attaches to boot disks for booting (for clusters, a RAID array needs two separate boot disks)
- Connecting and setting up each HBA for booting, one at a time
- Setting up disk connectivity from each unique boot disk to its server, using the command line interface (CLI) or GUI
- Installing the Windows operating system on a unique and dedicated disk in the RAID array
- Ensuring that the drive letters are the same for both servers' boot disks
- Booting the servers
- Installing cluster software

NOTE:

You must run the Smart Component from a CLI to ensure that you have the proper driver parameter settings. For example:

```
C:\>cp00xxxx.exe /x
```

Considerations for multipath environments

Multipathing provides high-availability computing through a redundant data path to the RAID array.

Because Microsoft requires that the boot HBA be different from the shared-data HBA, when using the SCSIPORT miniport driver in a cluster configuration, each server must have four HBAs (with a minimum of two for boot and two for data, bringing the total to a minimum of eight HBAs for a two-node cluster). This configuration provides data-path redundancy for boot and data. When using the Storport miniport driver, the boot and data paths can reside on the same HBA. Multipath software loads after the operating system has booted and should be treated the same as any other application installation.

For multipath software version information, see one of the following web sites:

- http://h18006.www1.hp.com/products/sanworks/secure-path/spwin.html
- http://h18006.www1.hp.com/products/sanworks/softwaredrivers/multipathoptions/windows.html

Windows boot setup procedures

Before you begin, complete the following steps:

- Review the information in "Required hardware and software" on page 5 and "Restrictions" on page 7.
- Install the operating system in a single-path configuration (only active channel). You can cable both paths and zone a single port to access the boot LUN until installation of the server operating system and the multipath software is complete.

Boot setup restrictions

The following sections describe boot setup restrictions for storage arrays.

EMA

The following restrictions apply to EMA:

- Windows Server 2003 does not support transparent mode.
- The Storport miniport driver is not supported.

XP

The following restrictions apply to XP:

- The boot LUN must be LUN 0.
- If one server is booting from a SAN, one host group is required for the server's HBA. If more than one server is booting from a SAN and accessing the same physical port, a unique host group is required for each server's HBA. Every host group must be assigned to a port with a unique LUN 0. If LUN security is turned off for this port (for example, port CL1-A), all servers defined in the host groups are given immediate access to all LUNs in the default host group.
- For detailed information about XP Disk Array host groups, LUN security, and host modes, see the *HP StorageWorks Command View XP user guide* on the web site http://h20000.www2.hp.com/bizsupport/TechSupport/DocumentIndex.jsp?contentType=SupportManual&locale=en_US&docIndexId=179911&taskId=101&prodTypeId=12169&prodSeriesId=64820.

MSA

If the primary boot HBA is connected to the standby controller, it must be physically disconnected for the secondary HBA to boot the operating system. Otherwise, the primary boot HBA must be connected to the active controller for the operating system to boot.

NOTE:

The primary HBA is the first HBA port discovered in the PCI scan.

Setting up the server

Before setting up for booting from a SAN, you must set up your server.

ProLiant servers are available in two configurations. Newer models use the ROM-based Setup Utility (RBSU), while older models do not. For servers with RBSU, see "Setup for RBSU servers" on page 19.

Setup for RBSU servers

To set up RBSU servers:

1. Download the latest ROM BIOS from the HP web site http://welcome.hp.com/country/us/en/prodserv/storage.html.
2. Install the ROM BIOS from the Smart Start CD-ROM or from the downloaded version.
3. Set the boot order:
 a. While the system is booting, press **F9** to start the RBSU.
 b. Select **Boot Controller Order**.
 c. Select the primary HBA and move it to Controller Order 1.
4. Disable the Embedded Boot Controller.
5. Exit the utility.

Setting up the HBAs

This section describes how to set up Emulex and QLogic HBAs.

To use EVA XL with direct-connect topology, your configuration must meet the following requirements:

- You must have XCS 6.000 or later to support direct-connect topology. For information about setting the direct-connect topology mode from the EVA controller, see the *HP StorageWorks 4000/6000/8000 Enterprise Virtual Array user guide*.
- You must set the topology for Emulex HBAs to `Default Loop`, then to`Point to Point` or `FC-AL only`.
- You must set the topology for QLogic HBAs to `Loop only`.

Emulex HBAs

To set up the HBAs:

1. Record the IEEE number (WWN) for each HBA.
2. Configure the HBA:
 a. While the server is booting, press **Alt+E** when the following message appears:

      ```
      Press <Alt E> To Go To Emulex BIOS Utility.
      ```

 b. Perform the steps in "Initializing zoning" on page 21.
 c. At the Enter a Selection prompt, select the first booting HBA.
 d. Select **Option 2**, **Configure This Adapter's Parameters**.
 e. Select **Option 1**, **Enable or Disable BIOS**. Press **1** to enable BIOS.

 NOTE:
 After installing the Windows operating system, repeat step a through step e for any other HBAs.

 f. Select **Option 4**, **Topology Selection,** <**Advanced Option**>.

 NOTE:
 This step is not required for Emulex-based Mezzanine blade servers.

g. Select **Point to Point**. Press **Esc**.

h. For EMA arrays, select **Option 8**, **Enable Start Unit Command**, <**Advanced Option**>. Press **1** to enable.

 Omit this step for MSA, XP, or EVA4000/6000/8000 arrays.

i. Press **X** to exit and reboot the server.

3. Configure the boot devices:

 a. While the server is booting, press **Alt+E** when the following message appears:

      ```
      Press <Alt E> To Go To Emulex BIOS Utility.
      ```

 b. At the Enter a Selection prompt, select the first booting HBA.

 c. Select **Option 1**, **Configure Boot Devices**.

 d. In the list of Saved Boot Devices, select **1** as the primary boot path or **2** as the secondary boot path.

 You may need to press **Esc** and then select again.

 e. Create a LUN by following the appropriate procedure in "Creating a LUN" on page 21.

 f. At the Select Two Digit Number of the Desired Boot Device prompt, select the WWPN for the desired boot port.

 NOTE:

 Each controller port has a WWPN. The WWPN must be identical for all ports, except for the last number. Use the last number to determine the controller port from which you are booting.

 g. At the prompt, enter the two digits of starting LUN (hexadecimal). Use the LUN number for the LUN you created in step 3e.

 h. Select **1, Boot This Device via WWPN**.

 i. Select the LUN from the list.

 For example, select 01.

 j. Reboot the server.

 NOTE:

 For an Emulex-based Mezzanine blade server, ensure that the switch has the default settings. For more information, see the Mezzanine blade server documentation.

QLogic HBAs

To set up the HBAs:

1. Install all HBAs.
2. Configure the HBAs:

 a. While the server is booting, press **Ctrl+Q** to enter *Fast!*UTIL.

 b. Perform the steps in "Initializing zoning" on page 21, and then go to step 2c.

 c. From the Select Host Adapter menu, select the HBA you want to boot, and then press **Enter**.

 d. From the *Fast!*UTIL Options menu, select **Configuration Settings**, and then press **Enter**.

 e. From the Configuration Settings menu, select **Host Adapter Settings**, and then press **Enter**.

 f. From the Host Adapter Settings menu, change Host Adapter BIOS to **Enabled** by pressing **Enter**.

g. Press **Esc** to return to the Configuration Settings menu.

h. Select **Selectable Boot Settings**, and then press **Enter**.

i. From the Selectable Boot Settings menu, enable the Selectable Boot option, move the cursor to **Primary Boot Port Name, Lun**, and then press **Enter**.

NOTE:

After performing this step, the server may appear to hang. *Do not* reboot the server. Go to the next step and create the LUN. The server responds as expected.

j. Create a LUN by following the appropriate procedure in "Creating a LUN" on page 21.

k. Select **Primary Boot Port Name, Lun**, and then press **Enter**.

l. From the Select Fibre Channel Device menu, select the device to boot from, and then press **Enter**. If more than one device has access, select the supported LUN (the LUN you created in ???).

3. Save the changes by pressing **Esc** twice.

Setting up switch zoning

You must set up switch zoning as part of your configuration. See the figures in "Cabling options for single-channel HBAs" on page 10 and "Cabling options for dual-channel HBAs" on page 13.

NOTE:

Switch zoning is not required if the system is directly connected to storage arrays.

Initializing zoning

To initialize zoning:

1. Create a zone that includes the boot HBA port and one array port using the WWN or switch port number.
2. Enable the zone.

Finalizing zoning

To finalize zoning:

1. Modify the initial zone to include the second array port.
2. Create a zone in the second fabric to include the secondary boot HBA port and the two remaining array ports.

Creating a LUN

This sectiion describes how to create LUNs on storage arrays.

Creating a LUN on EMAs

To create a LUN on Enterprise Modular Arrays:

1. Using a terminal emulator or a terminal connected to the storage subsystem, enter the following CLI commands to configure a device with no access allowed:

   ```
   HSG> initialize disk10000
   HSG> add unit d1 disk10000 disable_access_path=all
   HSG> show dl
   ```

2. Note the controller that recognizes the LUN as online.
3. Verify that the HBA is online by entering the following command:

   ```
   HSG> show connections
   ```

4. Optionally, rename the connection.
5. Allow the HBA to access the LUN by entering the following command:

   ```
   HSG> set dl enable_access_path=!newcon01
   ```

For more information about LUN configuration, see the *HP StorageWorks HSG80 installation and configuration guide*.

Creating a LUN on EVAs

To create a LUN on Enterprise Virtual Arrays:

1. Access Command View EVA or the HSV Element Manager through a web browser.
2. Create the LUN and assign a host. You must create a host if one does not exist.
3. Return to the server.

For detailed information about using the Command View EVA, see the *HP StorageWorks Command View EVA getting started guide*.

Creating a LUN on MSAs

To create a LUN on Modular Smart Arrays:

1. Create a virtual disk (LUN) using the Array Configuration Utility (ACU) on a separate server.
2. Using the Selective Storage Presentation option, assign the LUN to the HBA connection.
3. Return to the server.

Creating a LUN on a blade server

If you are creating a boot LUN on a blade server, consider using the following procedure if there is no separate server for the ACU.

Before you begin:

1. Obtain Integrated Lights-out (iLO) with firmware 1.40 or later. The latest iLO is available on the server support page www.hp.com/go/blades.
2. Obtain the latest MSA Support Software CD-ROM from the web site http://www.hp.com/go/msa1000.
3. Browse to the iLO interface.

NOTE:

The server you use to browse to the iLO web interface contains the CD-ROM drive for the Virtual CD option.

4. Insert the MSA Support Software CD-ROM in the drive.
5. Power-cycle the blade server.

 The server boots to the MSA Support Software CD-ROM.
6. After creating the LUN, exit the ACU, and then exit the MSA Support Software program.

 The server reboots.
7. Disconnect the Virtual CD from the Virtual Media page.

For detailed information about using the ACU, see the *HP StorageWorks array configuration guide*.

Creating a LUN on XP

Using a web browser, start Command View XP and perform the following steps:

1. Select a port (such as CL1-A).
2. Set LUN security for the array port.
3. Create a host group with the proper host mode (for Windows, host mode is 0x0C).
4. Assign the WWN of the first boot HBA port to the newly created host group.
5. Assign LUN 0 to that host group.

For detailed information about using Command View XP, see the *HP StorageWorks Command View XP for XP Disk Arrays user guide*.

Installing the operating system

This section describes how to install Windows operating systems for boot from SAN.

Installing from the Rapid Deployment Pack

For the ProLiant Essentials Rapid Deployment Pack, you must use deployment jobs modified for boot from SAN deployment to install the operating system. For detailed instructions, see Rapid Deployment Pack Knowledge Base Article 127, available on http://www.hp.com/servers/rdp/kb.

To install from the Rapid Deployment Pack:

1. Update the driver using one of the following:
 - Driver Smart Component for your HBA, available on http://h18006.www1.hp.com/storage/saninfrastructure.html
 - MSA Support Software CD-ROM
 - Latest ProLiant Support Pack

 For Emulex HBAs on Windows 2000 systems, the Found New Hardware Wizard displays the Emulex Utility IFC Dev. SCSI ASCIT8 device after the first reboot. Click **Cancel** here and for any other prompts for new hardware. This device is installed with the Software Solution Kit or the Smart Component.

 For Windows NT systems, download the latest the Software Solution Kit and run the driver update to install the Adjunct driver, or install the latest drivers from the HP web site http://welcome.hp.com/country/us/en/support.html.
2. Install the latest operating system service pack.

3. Optionally, install the Storport miniport driver by performing step 2 through step 4 of "Installing the driver" on page 17.

NOTE:

The Storport miniport driver is not supported on Windows NT 4.0, Windows 2000, or Enterprise Modular Arrays.

4. For multipath systems, install Secure Path for Windows or MPIO software.

Installing from the CD-ROM

To install from the CD-ROM:

1. Download the latest boot from SAN driver files from http://h18006.www1.hp.com/storage/saninfrastructure.html.

 Do not extract files from the Smart Component.
2. Create a driver diskette that contains the HBA driver files.
3. Insert the Windows operating system CD-ROM.
4. Reboot the server.
5. For Windows 2000 and Windows Server 2003, press **F6** when prompted. For Windows NT, press **F6** immediately after the text setup starts.
6. When the setup program prompts you to specify an additional device, select **S=Specify Additional Device**.
7. Insert the HBA driver diskette you created in step 2.

 A list of devices appears.
8. Select the appropriate HBA.
9. Complete the operating system installation.

NOTE:

For Windows NT, do not install networking until the operating system installation is complete. Windows 2000 and Windows Server 2003 do not have this restriction. You can install networking during setup.

10. After the operating system installation, update the driver by accessing the latest Smart Component version on http://h18006.www1.hp.com/products/storageworks/softwaredrivers/enterprise/index.html.
 - For Emulex HBAs on Windows 2000 or Windows Server 2003 systems, the Found New Hardware Wizard displays the Emulex Utility IFC Dev SCSI ASCIT8 device after the first reboot. Click **Cancel** here and for any other prompts for new hardware. This device is installed with the Software Solution Kit or the Smart Component.
 - For Windows NT, use the Smart Component to install the Adjunct driver.
11. Install the latest operating system service pack.
12. Optionally, install the Storport miniport driver by performing step 2 through step 4 of "Installing the driver" on page 17.
13. For multipath systems, install Secure Path for Windows or MPIO software.

Setting up multipathing

This section describes how to set up multipathing for boot from SAN.

Setting up the remaining HBA ports and array ports

To set up the remaining ports:

1. Connect the remaining HBAs.
 a. Set up a secondary HBA for booting.
 b. Connect any additional (nonbooting) HBAs. (You do not need to make any BIOS changes.)
2. Finalize the zoning as described in "Finalizing zoning" on page 21.
3. Using a configuration tool, add the HBA paths to the LUN.
4. Using the HBA BIOS, add the boot path to the first HBA, and then configure the second HBA's boot paths by performing the steps in "Setting up the HBAs" on page 19.

NOTE:

Put nonbooting HBAs in a different host folder than the boot from SAN HBAs for Command View EVA.

Setting up the other servers

Perform the following setup steps for the other servers before you begin the cluster installation:

- "Setting up the server" on page 18
- "Setting up the HBAs" on page 19
- "Setting up switch zoning" on page 21
- "Creating a LUN" on page 21
- "Installing the operating system" on page 23

Setting up the cluster

To set up the cluster:

1. Reboot the server.
2. Run the Boot from SAN Cluster Registry Update utility (`BFSCLRegUp.exe`) to avoid registry problems during the cluster installation.
3. Install the clustering service.

 See the following documentation:

 - Microsoft cluster installation documentation
 - For supported configurations, the Microsoft Windows catalog
 - HP ProLiant Clusters web page http://support.microsoft.com/kb/886569/en-us

Deploying servers that boot from a SAN with the Rapid Deployment Pack 1.40 or 1.50

This section describes how to modify the Windows-scripted install jobs provided with the Rapid Deployment Pack 1.40 or 1.50 to deploy servers that boot from SAN.

Note the following:

- HP recommends using Rapid Deployment Pack 1.60 or later. However, if you are using Enterprise Modular Arrays, you must use Rapid Deployment Pack 1.40 or 1.50. For information about using Rapid Deployment Pack 1.60 or about supported servers, see http://www.hp.com/servers/rdp.
- HP strongly recommends that you make a backup copy of each file or deployment job before making any changes.